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TECHNOLOGY DEPARTMENT

SCIENCE NEWS LETTER

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DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 20, 1948



Meson Makers

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MEDICINE

Hasten Stroke Recovery

Injection with procaine hydrochloride has brought improvement within 10 minutes after a seizure of apoplexy. May lessen permanent brain damage.

► AN "emergency treatment" can now speed recovery from apoplexy, or stroke as it is popularly called. It is reported by Drs. N. C. Gilbert and Geza de Takats of St. Luke's Hospital, Chicago, in the *Journal of the American Medical Association*, (March 6). The new method may lessen permanent brain damage.

The treatment consists in the injection of a local anesthetic, procaine hydrochloride, into a mass of nerve cells near the vertebrae at the base of the neck. Improvement should come within 10 minutes. The patient should recover consciousness, be able to speak or to speak more clearly, move arms and legs and flaccid, or limp, paralysis should be abolished.

While some patients improve anyway during the first few hours after a stroke of apoplexy, they do not do this within the first few minutes, the physicians point out.

A good response to this treatment was obtained in 19 of 25 patients. The results, the physicians say, "suggest that a less passive attitude should be taken in regard to the treatment of apoplexy."

The earlier the treatment is begun, the better the chances for speeding recovery. If improvement does not follow or the patient relapses, a second injection should be given. At present they give the treatment daily until no further

improvement is seen in the patient.

Results will be better in some kinds of apoplexy than in others. If the apoplexy is due to hemorrhage in the brain, the treatment is least effective, and is not recommended. If the apoplexy is due to a thrombus, that is, a clot in a blood vessel of the brain, the injection treatment may help and should be given.

The treatment is most effective in a third kind of apoplexy, that due to a clot which formed in a blood vessel elsewhere in the body and which was carried by the circulation to a smaller blood vessel in the brain. While all 10 patients with this condition, called cerebral embolism, improved immediately, the treatment did not necessarily change the course of the disease and one of them died on the fifth day. Patients who get apoplexy of this type are usually younger and have previously had rheumatic or other heart trouble or embolism elsewhere in the body.

With the injection treatment, other measures are also advised by the Chicago physicians. Important among these is an oxygen tent with the patient placed in a position to help the drainage of mucus so that he will not get pneumonia which is the biggest cause of death in patients who survive the first 48 hours after an apoplectic stroke.

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BIOCHEMISTRY

Explain Fat in Diabetes

► AN explanation for the idea that overweight has something to do with the onset of diabetes is given by studies of Drs. M. C. Nath and H. D. Brahmachari, of the University at Nagpur, India, and reported in the British scientific journal, *Nature* (Jan. 3).

Chemicals found in the body during the breakdown of fat, known as acetone or ketone bodies, "can be held responsible for the onset in the long run of diabetes mellitus," they state.

These chemicals are present in abnormal amounts in both blood and urine in diabetes. Normally they are oxidized further in the body and are

capable of furnishing a large amount of energy. In diabetes, either the body cannot oxidize them further for energy production or they are produced in excessive amounts.

Their accumulation, the Indian scientists state, is responsible for either lowering the production of insulin or decreasing its potency in bringing about utilization of sugars and starches.

First clue to the fact that the acetone bodies can lower the potency of insulin came when the scientists injected the acetone bodies into normal rabbits. The rabbits lost their ability to tolerate starches and sugars and got too much

sugar in their blood, as diabetics do.

Next the scientists tested the chemicals in animals that had their pancreases removed at different times. The pancreas is the gland that produces insulin. After the acetone bodies were injected, these animals at first produced insulin that was 50% more potent than the insulin from pancreases of normal animals. But this was followed by a gradual reduction in potency of the insulin, so that 70 days after injection of the chemicals, the insulin from the pancreases removed at that time was 50% below normal potency.

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AERONAUTICS

Instruments Carried into Upper Air by New Missile

► AMERICAN scientists have a new, high-speed research vehicle for upper air exploration. Called the "aerobee," the new missile is smaller than the famous German V-2, most-used missile for carrying of scientific instruments into the little-known upper atmosphere.

In its first publicized firing at White Sands, N. Mex., the aerobee climbed to 78 miles altitude and reached a speed of 4,400 feet per second, or approximately 3,000 miles per hour. Unlike the V-2, the new liquid-fueled missile is designed primarily for carrying instruments into the upper atmosphere.

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NEW LIQUID-FUELED MISSILE
—Shown here leaving the launching rack, the aerobee will be used to carry scientific instruments for upper air exploration.

MEDICINE

New Antibiotic Is Potent

Polymyxin, now undergoing trial, may replace streptomycin in the treatment of some diseases. Found 1000 times more effective against Friedlander's germs.

➤ A NEW anti-germ chemical from a bacillus commonly found in soil and water that appears better than streptomycin and may replace it in treatment of some serious diseases is under trial at the Johns Hopkins Hospital, Baltimore, Md.

Results in the first seven patients who got this new remedy were reported by Drs. Emanuel B. Schoenbach, Morton S. Bryer, Elinor A. Bliss and Perrin Long of the Johns Hopkins School of Medicine at the Johns Hopkins Medical Society meeting.

Polymyxin is the name of the new, "uniquely effective" antibiotic. It was discovered less than a year ago by two research teams working independently, Drs. R. G. Benedict and A. F. Langlykke of the U. S. Department of Agriculture's northern regional research laboratory at Peoria, Ill., and Dr. Harold White and associates at the American Cyanamid Company.

Whooping Cough

A six-weeks-old baby and his 13-months-old brother who were seriously ill with whooping cough are among the seven patients helped by polymyxin in its first trials. The little baby's temperature had reached 103 degrees Fahrenheit. Within one day after polymyxin was started, his temperature was normal. While the Hopkins doctors are too cautious to say the new remedy saved the baby's life, they and other doctors know that whooping cough in so young an infant is always serious, often fatal.

An 11-months-old baby with a severe burn that became infected with the blue pus-forming germ, *Bacillus pyocyaneus*, had been given every other kind of treatment without effect. Within six days, polymyxin had cleared up the infection so the baby could have skin grafting done to replace the tissue destroyed by the burn.

Two units of polymyxin, the Hopkins scientists found, would stop the growth of a germ that 50 units of streptomycin did not stop. This finding was made when they tested the new drug in the laboratory against the germ cause of a severe skin infection in another little boy. When the laboratory

tests showed the polymyxin would be effective, it was given to the boy and his infection cleared up.

Polymyxin is not, as far as is known, effective against tuberculosis germs against which streptomycin is powerful. But it is more effective than streptomycin against most gram negative germs. These germs do not cause serious illness as often as, for example, the streptococci against which penicillin is so effective. But when the gram negative germs do cause serious illness, it is worse than the illnesses caused by gram positive germs such as streptococci.

Plague, undulant fever, tularemia (rabbit fever), certain types of meningitis and of blood poisoning and wound infections, bacillary dysentery, typhoid and paratyphoid fevers and many types of urinary tract infection may be remedied by polymyxin, if it comes up to present expectations. The Hopkins scientists are continuing their studies and hope to try it on more patients with different ailments.

Good results have already been obtained in two cases of undulant fever, though with a disease characterized by frequent relapses as this one is, it is too soon to know whether polymyxin is a real cure.

Undulant Fever

One patient was a 39-year-old housewife who had an acute attack of undulant fever. Within eight days after polymyxin was started, her temperature had dropped from 106 degrees Fahrenheit to normal. The drug was given for five more days, and her temperature remained at normal. The drug was then stopped and one week later she could be discharged from the hospital as "well."

The drug brought the temperature to normal in another undulant fever patient who had the disease in chronic form and had been sick for two years off and on. Both these patients will be watched for possible relapses. If there are none, polymyxin will have done what no other treatment has so far.

Only death among the seven patients was that of a 58-year-old man who had been ill since last October. He had meningitis due to a germ called Fried-

lander's bacillus. He was sick for three months before he came to the hospital, and polymyxin had not been tried until after nothing else helped.

He began to get better with polymyxin treatment. His temperature was down to normal in four days, and cultures of his blood had no more of the Friedlander's germs. Then, suddenly, an unsuspected abscess behind his appendix opened between two vertebrae and pus from it spread into his spinal canal. The man got very sick again and within a day was dead. The reason the abscess had not been suspected was that the man was so sick when he reached the hospital the doctors could not examine him thoroughly enough to make the diagnosis. All they could do was treat the infection which they knew was present because of the fever and blood tests.

Friedlander's Bacillus

Polymyxin's power against this extremely dangerous Friedlander's bacillus, however, was shown both in the patient's response at first and in laboratory tests. These tests showed that polymyxin was more than 1000 times more effective than streptomycin against the germs making the patient sick. The growth of these germs in the test tube was stopped by an amount of polymyxin that weighed only one-thousandth of an amount of streptomycin which the germs were still able to resist.

Polymyxin is given by hypodermic injection into the muscles every three hours at present. But further studies may show that it can be given less often. It is safe and so far there have been no unpleasant side-effects in the patients with one exception. This was the development of fever after 10 days of polymyxin treatment in the man who had had undulant fever for two years. This was probably an allergic reaction, and may not occur often.

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ASTRONOMY

New Moon Discovered For Planet Uranus

➤ A NEW moon has been discovered, but it will be no help to romance or songwriters.

The moon, or satellite, is closer to the distant planet, Uranus, than to the earth. Even astronomers peering through the 82-inch telescope of the McDonald Observatory of the Universities of Texas and Chicago at Fort Davis, Texas, cannot see it.

Uranus' newly-discovered moon was found on photographic plates. It shows up on a photograph after two or three minutes exposure, reports Dr. Gerard Kuiper, director of the observatory.

The newest moon found in our solar system was spotted, via photographs, during the period when the observatory was making studies of possible life on Mars. It was first located on Feb. 15, and the discovery has since been con-

firmed by more recent photographs.

Tiny compared with the earth's moon, the new satellite of Uranus is probably not over 300 miles in diameter, Dr. Kuiper estimates. It is well within the orbit of four previously-known moons of Uranus and is an estimated 75,000 miles from the planet. The moon completes its path around Uranus in about 30 hours.

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MEDICINE

Mass Detection of Cancer

A new simple and quick blood test for this disease has been discovered which may be used as a mass screening agent such as X-rays are for unsuspected tuberculosis.

➤ A NEW blood test for detecting unsuspected cancer was announced by Drs. Maurice M. Black, Herman Bolker and Israel S. Kleiner of the Brooklyn Cancer Institute and New York Hospital at the Atlantic City meeting of the American Association for Cancer Research.

The test is so simple and quick that, if further study confirms its value, it could be used as a mass screening agent to detect cancer in the population something as X-rays are now used in large population groups to detect unsuspected tuberculosis.

The test is made by putting a small amount of the person's blood plasma in a glass tube, diluting it with distilled water and taking a reading of the light transmitted through the plasma with a photoelectric colorimeter. The tube of diluted plasma is then put in vigorously boiling water for 10 seconds and a second light transmission reading is made. The heat coagulates the plasma and the difference between heated and unheated plasma is measured in terms of heat coagulation.

Blood plasma from cancer patients coagulates much faster when heated than blood plasma from healthy persons or from persons sick with diseases other than cancer. The coagulation measure, Dr. Black and associates believe, can therefore be used to detect the presence of cancer.

The test developed from studies the scientists were making with another blood test for cancer reported at the International Cancer Congress last fall. (See *SNL*, Sept. 13.) In this earlier test, it was found that blood plasma from cancer patients quickly decolorized a dye, methylene blue.

Both tests have now been tried on several hundred persons, some healthy, some cancer patients and some sick with other diseases. The two tests can be made in 15 minutes and when combined have an accuracy of more than 95% in showing the presence of cancer.

The new test depends on the presence in the blood of fibrinogen, chemical which is involved in blood clotting. But some other as yet unknown factors are believed also to be involved in the changes in heat coagulation of plasma from cancer patients.

The new test, Dr. Black said, is "particularly interesting from the prognostic standpoint." It gives an objective means of following the effects of treatment.

Inhibit Enzymes in Cancer

➤ A CHEMICAL adaptation treatment that has been helping patients with leukemia, Hodgkin's disease and cancer was reported by the same group. Its chief importance lies in the clues it gives to possible chemical solution of the cancer problem (See *SNL*, Sept. 20). The chemicals used are enzyme inhibitors. They interfere with or block enzyme chemicals needed by the cancer cells. But the cancer cells soon adapt themselves to life without one of these enzymes. At this point, the doctors do some adapting. They adapt the treatment by giving different chemicals, which stop a different set of enzymes needed by the cancer cells. When the cancer cells, in turn, adapt to this situation, the doctors switch chemicals again.

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INVENTION

New Flaming Method Rids Cottonseed of Lint

➤ PRICE C. McLemore of Montgomery, Ala., already well known as the originator of the flame-cultivation method for killing weeds, offers a new flaming method for ridding cottonseed of lint. It consists essentially of wetting the seed with a highly flammable liquid like gasoline or alcohol, then setting fire to it. The resulting flash flame effectively removes the lint, yet does not affect the germination of the seed. Patent 2,437,397 has been issued on this invention.

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NUCLEAR PHYSICS

How Mesons Were Made

Their creation may open up unprecedented opportunities for understanding mysterious sub-nuclear processes, cyclotron inventor believes.

See Front Cover

► CREATION of mesons artificially in the giant Berkeley cyclotron is called "the most significant event in fundamental nuclear studies since the discovery of uranium fission." (See SNL, March 13).

Tracks of the mesons were observed on photographic emulsion plates placed adjacent to targets of carbon, beryllium or other materials against which the great cyclotron hurls 380,000,000 electron-volt alpha particles, the nuclei of helium atoms.

Dr. Ernest O. Lawrence, inventor of the cyclotron, Nobelist, and director of the University of California radiation laboratory, believes that the development opens up unprecedented opportunities for understanding mysterious sub-nuclear processes, particularly the nature of the force which holds the nucleus together and subtle influences of atomic particles on each other. The meson is the best tool ever obtained for examining these forces. Because the largest cyclotron possesses just barely enough power to produce low energy mesons, super atom-smashers must be built.

Men Who Did Experiments

The two men who did the experiments, Dr. Eugene Gardner, research physicist in the Radiation Laboratory, and Dr. C. M. G. Lattes, a Brazilian scientist from the University of Sao Paulo, who came to Berkeley recently on a Rockefeller Foundation Fellowship, are shown on the cover of this week's SCIENCE NEWS LETTER.

In the photograph, Dr. Gardner is holding an experimental assembly of meson apparatus which Dr. Lattes is about to help put in the cyclotron chamber.

Dr. Lattes for the past two years worked with a group of scientists at the University of Bristol, Bristol, England. Dr. Lattes, Dr. C. F. Powell, and Dr. G. P. S. Occhialini, working at Bristol, have led in the application of specialized techniques for studying cosmic rays by means of photographic emulsions. Drs. Gardner and Lattes and Prof. Robert R.

Serber, nuclear physicist in charge of the theoretical work in the Radiation Laboratory, joined with Drs. Gardner and Lattes in explaining how the mesons were observed.

Before the Bristol findings were revealed, it was generally believed that only one kind of meson existed. This particle was suggested in the 1930's by a Japanese scientist, Dr. Hideki Yukawa, to explain a gap in the atomic theory of that day; such a particle was later found in cloud chamber experiments by Dr. Carl D. Anderson, of California Institute of Technology, and he called it a mesotron. The names meson and mesotron have been used interchangeably.

Meson Found at Sea Level

Dr. Anderson's meson was found to have a mass of about 200 times that of the electron and either a positive or negative charge of electricity. Found at sea level, this meson has a life time of two millionths of a second and energies up to billions of electron volts. It is a secondary cosmic ray particle, and scientists considered that it was made as a result of the bombardment by heavy,

energetic primary cosmic rays entering the earth's atmosphere from outer space and colliding with nuclei of the atmosphere.

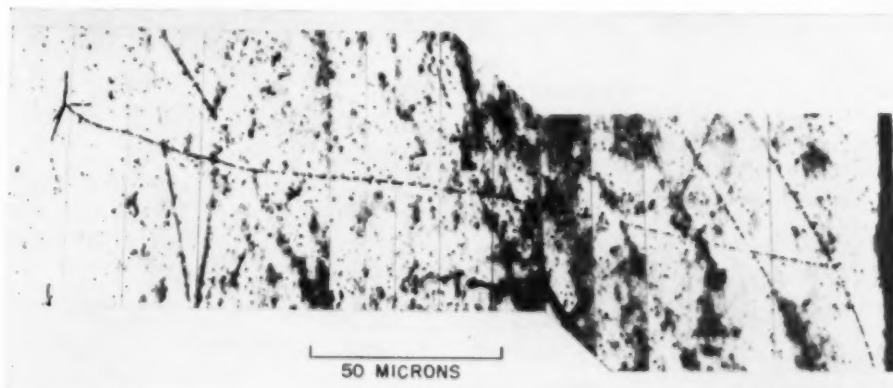
Scientists tried to tailor their theories to fit the idea that only this one kind of meson existed. One of their great difficulties was that this meson did not interact with atomic nuclei. Its birth could not be explained adequately, and its brief existence was climaxed by oblivion. But it was obvious that these light mesons were the product of nuclear particle collisions.

Years of Careful Study

During years of careful study and development of special techniques, the scientists at Bristol, taking their emulsions to mountain tops in the Andes and Pyrenees, were able to explain how the light meson often originated from a heavier meson.

They found on their photographic emulsions, mesons of a mass of about 320 times that of the electron. They found that these heavy mesons were both positively and negatively charged, and there was some evidence that neutral mesons also existed.

All of these heavy mesons were studied at very low energies, of a few million electron-volts, when they were close to or undergoing disintegration. At these energies, the positively charged heavy mesons, being unable to penetrate the electrical barriers of positively charged nuclei, simply wandered through the photographic emulsion until they



MESON TRACK—is shown in this photomicrograph. The edge of the emulsion plate is at right. In the beginning, with an energy of 4 million electron volts, the track of the meson is light, becoming heavier as it reaches the point of capture by a nucleus. It explodes the capturing nucleus, resulting in a "star". The reason for lightness of track at right, heaviness near star, is that a charged particle will affect more electrons of atoms through which it is passing as it loses energy. Dark parallel lines on the right hand edge show the edge of the photographic plate. The scale gives some idea of the length of the track—about four one-hundredths of an inch long.

disintegrated, giving birth to light mesons.

However, the negatively charged heavy mesons were greedily swallowed by nuclei, resulting in the detonation of the capturing nuclei into showers of particles called "stars". At the end of their course, when nearing capture, the mesons made a wavy track. The wavy track is made because the particle is relatively light, and, at the extremely low energies involved, it takes a severe buffeting from nuclei in the emulsion.

The negative heavy mesons are the type which have been produced in the giant Berkeley cyclotron. The Berkeley research shows they have a mass of 313. The characteristic wavy track and the

"stars" resulting from the detonation of nuclei are also observed. About half the meson tracks observed end in "stars".

Theoretical calculations indicate that mesons were being made from the beginning of the operation of the giant cyclotron over a year ago. The first plate exposed on Feb. 21 of this year for 30 seconds yielded 100 times as many mesons per plate as were obtained in the Andes from cosmic rays in 45 days. This is 10,000,000 times as many mesons per second in the cyclotron as on a mountain top. On the first night one track in 10,000 was a meson, while now the method has been improved so that one track in 10 is a meson.

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PHYSIOLOGY

Sex Affects Skin's Color

Spectrophotometric studies show that a woman's skin is paler in color than a man's. Sex glands produce hormones which regulate the skin color.

► SEX differences and variations in sex gland activity are reflected in skin color. Spectrophotometric studies showing these were reported by Dr. Edward A. Edwards of Harvard Medical School and Tufts College Medical School at the meeting of the Optical Society of America in New York.

The spectrophotometer is an instrument used to analyze colors in a substance from the light it gives off. Doctors every day look at the skin color of their patients for clues to their state of health. The spectrophotometer gives the same kind of information and much more. It detects not only the quantity of blood present in the skin but also how well it is supplied with oxygen.

With the aid of this instrument, Dr. Edwards and Dr. S. Q. Duntley of Massachusetts Institute of Technology have made an optical reconstruction of human skin. This was done by stripping a piece of skin off a cadaver. After the blood was washed out of it, the skin was mounted against the spectrophotometer window. Backing it was a parallel-sided glass cell filled with oxyhemoglobin solution. Behind this was a second glass cell filled with reduced hemoglobin solution, that is, blood's red color chemical minus oxygen. The "skin" was completed with a block of fat. By varying the concentrations of the two hemoglobin solutions, curves simulating various body

areas were obtained by this method.

The studies with the optically reconstructed skin were confirmed by studying the palm of a normal young man whose arm was bound by a tourniquet.

MEDICINE

Chemical Stops Hormone

A new principle in the treatment of cancer may result from the discovery that an anti-vitamin can interfere with the action of a female sex hormone.

► DISCOVERY that an anti-vitamin can interfere with the activity of a hormone, specifically a female sex hormone, was announced by Dr. Roy Hertz of the National Cancer Institute at the meeting of the American Association for Cancer Research in Atlantic City.

A new principle in treatment of disease may result. This new principle could apply not only to treatment of cancer but also treatment of many other diseases in which glands and their hormones are involved.

Dr. Hertz worked with chickens and monkeys. He gave the animals doses of a chemical called aminopterin. This is an antagonist, or anti-vitamin, to folic acid. This anti-vitamin stopped the

A woman's skin differs from a man's by being paler in color, showing less blood and less melanin, Dr. Edwards reported.

Melanin is a brown pigment found in large quantities in the dark races and is a prominent factor in sun tanning. The female skin, though having less of this pigment than the male skin, has more of another pigment, carotene. This is the chemical that gives carrots their color, and that in human skin is derived from vegetables, egg yolk and a few other sources of carotene.

The hormones produced by the sex glands regulate the skin color. Male castrates showed a sallow color, due mainly to lack of blood supply. This could easily be corrected by doses of synthetic male hormone. These patients also had skin that did not tan as much as normal male skin, and which contained more carotene than normal male skin. Their skin was more like that of a woman's in these respects. These differences were also corrected by male hormone treatment.

The effect of hormones on female skin color was found in studies of women whose ovaries had been removed and also in periodic changes in skin color corresponding to stages of the menstrual cycle.

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growth response of chick tissues to the female hormone, estrogen.

The effect of hormones on the growth of tissues has recently been considered important in connection with cancer, which is a problem of abnormal growth. A relation between sex hormones and cancer of the breast is also known to exist and a number of scientists are working on this phase of the cancer problem. Some of them have been discussing their work at this meeting.

Cancers of the breast and uterus are known to have a certain dependence on stimulation by estrogens. In breast cancer it has been common practice to remove the patient's ovaries, or destroy them by X-ray or radium treatment.

The object of this is to stop their production of estrogen, in the hope of stopping the estrogen-stimulating effect on the cancer.

Dr. Hertz' discovery of the anti-folic acid chemical's effect opens the possibility of using this chemical instead of removing or irradiating the ovaries. It might prove even more effective, because it would also stop the activity of estrogen from sources other than the ovaries.

The relation between folic acid and estrogen stimulation was first observed

by putting chicks on diets that contained none of this vitamin. Trial of the anti-folic acid chemical came next. Diets lacking other vitamins, such as riboflavin, pantothenic acid and pyridoxine, were also tested. But they did not have much effect on estrogen stimulation.

The possibility that other hormones may depend on "trace factors" in the diet, such as vitamins, is opened by the discovery.

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AERONAUTICS-RADIO

Calculate Speed by Radio

To measure how fast speedy planes travel, an improved single ground-based radio station has been worked out. Plane must fly directly to or away from station.

► **FASTEST-TRAVELING** airplanes may have their speeds accurately determined by an improved single ground-based radio-frequency measuring device, Boeing Aircraft Company, Seattle, revealed.

The new system is based on the so-called radio Doppler system which was worked out by the National Advisory Committee for Aeronautics at Langley Field, Va., in 1941. The earlier development made use of two ground stations 14 miles apart and a radio transmitter in the plane. The new system uses only one ground station.

In the new Boeing system, the ground station transmits to the plane. A receiver in the plane picks up this transmission, doubles its frequency and gives it to a transmitter for sending back to the ground station. At the ground station, the original frequency is likewise doubled. When the two doubled frequencies are compared, that is, heterodyned or "beat" against each other, their difference gives data from which the speed of the plane is easily determined.

The principle behind the action is similar to what takes place with sound from a rapidly approaching locomotive. This sound becomes higher-pitched as the train approaches, and becomes lower-pitched as the train goes away from the listener. Reason for the change in pitch is that sound is made up of air waves traveling outward from their source. If the source is approaching, the waves reach the listener more rapidly, making the sound seem higher in pitch.

Radio emissions oscillate, or vibrate.

Although they travel with the speed of light, there is a difference in their frequency coming and going, just as with the sound from a speeding locomotive's whistle. Furthermore, this difference can be measured with great accuracy on an oscillograph in the new instrument.

With the new system, the airplane may fly at any altitude and anywhere within a 50-mile radius of one ground

station, but its speed can be measured only when it is flying directly to or away from the station. The oscillograph of the instrument can clock the plane during a flight of several miles, indicating exact speed at every instant.

A slow-moving plane, at speeds up to perhaps 150 miles an hour, can be clocked with a stop watch. For faster speeds this method is inaccurate. In official tests under the sponsorship of the Federation Aeronautique Internationale, speeds are measured by an elaborate high-speed camera installation.

In the radio Doppler system worked out by NACA, the test plane had to fly at low altitude directly on the course between the two ground stations. Receivers at each station were tuned to the transmitter carried by the plane before it left the ground, and also to an auxiliary ground transmitter operating on nearly the same frequency. Thus both receivers got a heterodyne whistle at the same audible frequency. A telephone wire connected the two stations and fed the two whistles into an oscillograph. As the plane flew the course, the station behind it got a lower-pitched note and the one ahead a higher pitched note. The frequency difference showed on the oscillograph.

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MEASURING SPEED OF FAST PLANES—This is the equipment used in the plane with the improved Doppler system of measuring speed. It receives a radio beam from a ground station, doubles its frequency, and returns it to the ground.

MEDICINE

Avert Invalidism in Man By Glass Button in Belly

► A MAN in New York owes his health to a glass button which he carries with him. The glass button occupies a unique position—it is under his skin on the lower right hand side of his abdomen. The man's case is reported by the surgeon who inserted the button, Dr. Jere W. Lord, Jr., of that city in the *Journal of the American Medical Association* (March 13).

The patient had been ill with cirrhosis of the liver. He was emaciated and had an accumulation of fluid in his abdominal cavity. The usual procedure, which failed to help him, calls for puncturing the cavity where the fluid has accumulated and draining it off. The patient may in this way lose several quarts of body fluid which contains protein. This causes a wasting of the body and is hard on the patient.

Dr. Lord combined two techniques with success in operating on this patient. He inserted a glass button which had brought temporary relief in other patients after its introduction by Drs. R. C. Crosby and E. A. Cooney in 1946, and he stripped the muscles of their connective tissues to expose the lymph glands at the suggestion of Dr. Irving S. Wright.

The glass button, which is inserted on the lower right hand side, has a cap on it to prevent the passageway from being blocked by membranous tissue. The fluid drains through this passage into a pocket in the body made by the doctor by removing the connective tissue covering the muscles. This exposes the lymph vessels which absorb the fluid.

Improvement was noted in this patient within three to four weeks, when the fluid in this artificially-made pocket disappeared. Within five and one-half months the patient showed no signs of ascites, or fluid accumulation, and was able to carry on his usual activities.

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BIOLOGY

Your Antibodies Have Long-Distance Action

► ANTIBODIES, your body's front line defenses against disease germs, have a long-distance action equivalent to your being able to "disintegrate an opponent from a distance of 60 feet," Dr. Alexandre Rothen, Rockefeller Institute for Medical Research scientist, estimates.

An electronic effect, or a "system of extended resonating oscillators," may account for this long-distance action. Enzymes, such as the trypsin in digestive juices which breaks down meat and other proteins, also have this long-distance action. It apparently is a property of protein-like chemicals which consist of extremely large molecules.

Trypsin's long-range action can be shown by coating a glass microscope slide with a protein, covering this with a blanket of jelly and then applying a coating of trypsin. The protein is broken down by the trypsin in spite of the solid layer of jelly between them.

This long-range action of body chemicals observed by biologists seems to contradict the classical chemical conception that molecules must touch before they react.

Science News Letter, March 20, 1948

ELECTRONICS

Dry Plastic Raindrops Are Used in Radar Study

► PLASTIC droplets, instead of raindrops, are being used by Westinghouse scientists to find out why clouds, rain and wet snow frequently block out very short radar waves before they reach their target.

These dry drops, Edward J. Duckett, of Westinghouse Research Laboratories, Pittsburgh, explained, are similar to real rain in size and shape and have the same electrical behavior. They serve as targets for ultra-short waves fired from a special radar set.

When the ultra-short waves less than a half-inch long were put into service they met interference from rain clouds, unlike the earlier radar which used longer waves. Instead of passing through the clouds, they bounced back to the radar receiver, thus obscuring the target. The use of these very short waves is highly desirable because they give a clearer picture on the radar scope than do longer waves.

To make the tests, the scientists would use real rain if they could get the kind they need just when they want it. The results of the work may have some bearing on weather forecasting. The fact that clouds and rain do stop radar of certain wavelengths has already been put to work in locating storm areas.

Science News Letter, March 20, 1948

IN SCIENCE

CHEMISTRY

New Chemical Weapon Against Insects Announced

► ANOTHER new chemical weapon against insects has been announced by the Du Pont Company. The latest insecticide is called Marlate. Chemically, it is bis (methoxyphenyl) trichloroethane. First tests indicate that Marlate is not dangerous to animals or plants but is effective against many insects.

Science News Letter, March 20, 1948

GENERAL SCIENCE

Man's Cerebrum Offers Hope for Lasting Peace

► MAN'S cerebrum—a part of his brain—is his best bet for lasting peace, a scientist said.

Dr. Ralph W. Gerard, professor of physiology at the University of Chicago, discussed the role of the brain in international affairs as a guest of Watson Davis, director of Science Service, on *Adventures in Science* heard over the Columbia network.

Dr. Gerard described the cerebrum as "that part of the brain lending itself to cooperative, altruistic, unselfish behavior."

"In the great panorama of evolution, the selfish competitive aspect of the brain or of behavior has changed very little, but the newer parts of the brain have steadily increased—the cerebrum—of which man has such a tremendous amount," he declared.

From the standpoint of the brain, the difficulty is that "what man does with his brain can change very much faster than the brain itself can change," Dr. Gerard pointed out.

"The capacity or size of man's brain hasn't increased from historic or pre-historic times on," he pointed out. "On the other hand, the social activities that depend on the brain have changed a great deal in the past 10,000 years."

"But I don't think I'm entirely rash and idealistic in looking forward to a time when the cooperative aspects of behavior will develop to the extent that men will learn to get along with each other, and wars will be a matter of the past," the scientist concluded.

Science News Letter, March 20, 1948

THE FIELDS

GENERAL SCIENCE

Two of Three 18-Year-Olds Will Live to Retirement

► THE chances are fully two out of three that a young man now starting his working life at the age of 18 will live to his retirement age of 65. The chances for his father and his boss surviving to their retirement at age 65 are good, too. A 45-year-old man today has 70 in 100 chances of reaching age 65 and the chances for a 55-year-old man are 78 in 100.

These chances for reaching the retirement age of 65, calculated by statisticians of the Metropolitan Life Insurance Co., reflect the marked decline in mortality in the United States since the turn of the century.

In 1900 the young man of 18 had only 51 chances in 100 of surviving to age 65.

Mom's chances of surviving to old age are even better than Dad's. More than three-fourths of the women now under age 65 will live to attain that age. The woman of 45 today has better than 80 in 100 chances of living to 65 years, and the woman aged 55 today has 86 in 100 chances of celebrating her 65th birthday.

Age 65 may spell retirement from the job, but it does not mean the end of life. Men and women today are outliving the Biblical three score years and ten lifespan.

"Currently," the life insurance company's statisticians state, "white men who reach age 65 can expect to live an additional 12½ years, on the average. For white females there remain an average of 14¼ years."

Science News Letter, March 20, 1948

AGRICULTURE

Activated Charcoal Guards Plants from 2,4-D Harm

► CROP plants can be protected from harm by 2,4-D used for killing weeds by pre-planting treatment with powdered activated charcoal, a three-man team of agricultural scientists has discovered. The treatment is of especial value for crops that are set out as young plants already rooted.

The work was done as a joint research project for the U. S. Department of Agriculture and the Mississippi Agri-

cultural Experiment Station by Drs. H. Fred Arle, O. A. Leonard and V. C. Harris.

2,4-D is frequently sprayed on fields to kill weeds before the crop is planted or set out. However, there may be enough of it left to do serious harm to chemically sensitive crop plants.

In the present experiments sweet-potato sprouts were used. Part of them had their roots dusted with the activated charcoal powder before planting and the rest were left untreated as controls. The latter group suffered very high mortality when set out in the 2,4-D-poisoned soil, while the treated plants, though sustaining some losses, survived much better.

Science News Letter, March 20, 1948

METALLURGY

99.8% Pure Helium Gas Produced by Government

► THE purest helium ever distributed commercially, within 0.2% of absolutely pure helium, is now available, the U. S. Bureau of Mines disclosed. It will be known as "welding grade helium" because its principal uses will probably be in the so-called shielded-arc welding process.

Helium is the lighter-than-air non-combustible gas used in American balloons and dirigibles, and is produced only in the United States. It is taken from natural gas in northern Texas fields and one field on the Navaho Indian Reservation, Arizona-New Mexico. Production is entirely by the government in plants operated by the Bureau of Mines.

Helium for commercial uses until now has been 98.2% pure instead of the 99.8% new product. The impurities in the 98.2% product are harmless in balloons and dirigibles and have no deleterious effects in the various medical uses developed during the past 25 years.

This high-purity helium is made from the helium previously produced by passing the latter through an additional separation unit containing refrigerated coconut charcoal. This charcoal absorbs most of the impurities, largely nitrogen and hydrogen, but takes up very little helium.

In use in welding, the noncombustible helium forms a shield over the welding arc which keeps the oxygen of the air away from the heated metal to prevent oxidation. With the new high-purity helium, the welding industry will be able to develop new and better techniques, it is expected.

Science News Letter, March 20, 1948

PHYSICS

New Type Prism Extends Infra-Red Wavelengths

► A NEW instrument for science and industry has given wavelength measurements in a previously unknown range of the invisible infra-red spectrum, the Optical Society of America was told at a meeting in New York.

Measurements of infra-red wavelengths up to 38 microns—a micron is .00003937 inch—were made at the National Bureau of Standards in Washington, Dr. Earle K. Plyler reported. A prism made of thallium bromide and thallium iodide was used for the study.

The thallium bromide iodide prism, called KRS-5, has extended the wavelengths in the infra-red region from approximately 25 microns for potassium bromide prisms and about 15 microns for sodium chloride prisms.

The new prism gives scientists a new tool for studying materials in a range of the infra-red spectrum which they have not been able to explore before. KRS-5 is not now available commercially, but it may find important industrial applications in the future for analyzing materials.

Science News Letter, March 20, 1948

ARCHAEOLOGY

Baking Babylonian Bricks Makes Writing Legible

► BAKING ancient Babylonian bricks in a modern electric furnace makes their ages-old cuneiform inscriptions easy to read—if you can read cuneiform. The technique, developed by Prof. Ferris J. Stephens of Yale University, involves heating the inscribed tablets for a day at a temperature of 1,400 degrees Fahrenheit, letting them cool for two days, then piecing the fragments carefully together and cleaning out each wedge-shaped stroke under a low-power microscope.

Inscriptions on these ancient tablets, some of them dating back as far as 3000 B.C., range all the way from business contracts and records of divorce suits to learned mathematical treatises. Some of the contracts are done in duplicate: after the deal had been duly set down by the scribe on a clay tablet and sealed by the contracting parties, it was wrapped in a clay envelope and the whole thing written again on the outside of this. This made it harder for Babylonian big businessmen to "put something over" on each other.

Science News Letter, March 20, 1948

AGRICULTURE

JVA To Renew Palestine Land

Jordan Valley Authority proposed to trade salt water for fresh through a canal to the dry coastal plain where it will be used for irrigation.

By DR. FRANK THONE

► DIVIDED Palestine can still offer a fair prosperity to both Jew and Arab, each working his own garden separately. But a united Palestine, with Jew and Arab working together to make the most of the land's resources, could provide a living level so high that both would wonder why they ever quarreled.

So declares Dr. Walter C. Lowdermilk, until lately assistant chief of the U. S. Soil Conservation Commission, and world authority on the redemption and resettlement of lost and wasted lands. Leading exponent of the boldly conceived project known as the JVA (for Jordan Valley Authority), he points out that although cooperation between the seemingly irreconcilable disputants is needed for its full realization, there are parts that can be operated as independent units, until the time comes when they can be fitted as integral links into the completed chain.

Profitable Undertaking

Basic idea of the JVA is a proposal to trade salt water for fresh—with a profit on both sides of the bargain. That kind of a deal should attract anyone with a sharp eye for business, be he Arab or Jew—or even Yankee. It may sound as fantastic as something out of the Arabian Nights Tales, but it is a perfectly practical modern engineering project. It has been declared financially feasible, too, by hardheaded bankers—able to retire the required capital investment of a quarter-billion dollars in 50 years, paying three percent interest the while.

The big trade, as proposed in the JVA project, is to divert a considerable part of the fresh water from the north, that now finds its way uselessly to the Dead Sea by way of the River Jordan, through a canal out to the dry coastal plain, there to be used for irrigation. To maintain the Dead Sea at its present level, a second canal will carry water from the Mediterranean into the Jordan valley, then follow a course parallel to the river until it empties into that great lake of concentrated brine. Since the Dead Sea is 1,300 feet lower than the Medi-

terranean, the plan is to build two great hydroelectric plants. Further revenues are expected from chemicals extracted from strong brine of the Dead Sea, especially magnesium, potash, iodine and bromine.

It is easier to understand Palestine by comparing it with southern California. Dr. Lowdermilk, and other scientists as well, have called attention to the striking resemblances between the two regions, in both geography and climate.

The basic pattern of both is the same: a rather dry coastal plain that runs up to a fairly high ridge, dropping off on the other side into an interior valley that at its southern end dips below sea level. Mountains to the north catch rain and snow, and make possible highly developed irrigation systems. This contrasts sharply with the extreme desert conditions that prevail in the deep southern valleys.

Parallels are not absolute, of course. Palestine has a big advantage in its underlying rocky structure. This is mainly limestone, which is honeycombed with caves and underground watercourses. These emerge as numerous springs, which help mightily in local irrigation works. Southern California's rock foundation is primarily granitic, which does not dissolve into water-carrying cavities as limestone does.

Centuries of Soil Abuse

Offsetting this disadvantage, southern California has newer, hence deeper and more fertile soils. The soils of Palestine have taken centuries of abuse, especially from nomadic tribes who in the past centuries have broken in, ruined the old balanced agricultural economy of the land, and provoked heavy soil erosion by overloading the hills with grazing flocks, particularly of goats. Dr. Lowdermilk estimates that since the Arabs brought their goats to those hills some 1,300 years ago, three feet of good soil has been washed off the hillsides. Upland slopes are left as bare rock; bottomlands are choked into malarial swamps with the silt. So there is plenty for modern agriculture and engineering to do.

You can even find a climatic "double"

in Palestine for most of the well-known places in southern California. Tel Aviv, on the coast, is the Los Angeles of the Middle East. Jericho, which is near the Dead Sea, has a climate like that of Palm Springs. Beersheba, southernmost Palestinian city, is the climatic analog of Riverside, while Tiberias, metropolis of present-day Galilee, has its California equivalent in San Bernardino.

There is much similarity in the crops of the two regions. The Biblical trilogy of abundance—corn, and oil, and wine—are California crops, too: barley and wheat are "corn," oil comes from olives, and vineyards were in Palestine even before the Children of Israel first came into the land. In modern Palestine as in California, citrus-fruit raising has become a major industry.

Need To End Present Strife

The great trade, of salt water for fresh, will become a reality only after Arabian-Jewish cooperation replaces the present condition of virtual civil war. However, even when that happier time comes, the entire scheme will not be put into operation at once; development has been planned for eight stages. And, fortunately, some of those stages can be started without waiting for the rest.

A beginning can be made, for example, at the northern end of the country, where the streams that eventually feed Lake Tiberias (the Biblical Sea of Galilee) come down from rainy Mt. Hermon and collect in swampy-shored Lake Huleh. The swamps can be drained and the waters channeled for irrigation farther downstream. About 37,000 acres of fertile land can be reclaimed for cultivation in this area alone. It should be possible to develop a good deal of water power in this short distance, for Lake Huleh is 230 feet above sea level and Lake Tiberias 700 feet below it. Since the entire Huleh district is included in the Jewish part of the new Palestinian state, much can be done here without waiting for Arab cooperation.

In Palestine there are some 40 of those desert watercourses known in the Arabic-speaking world as wadis; they would be called arroyos or gulches in our own West. Normally dry or at most carrying only a trickle of water, they occasionally catch a cloudburst and pour out destructive floods. The JVA project calls for putting dams across most of these and saving the storm waters that are now



DIVERTING EARTH'S WATERS
—A salt-water canal will route Mediterranean water into the Dead Sea, to replace fresh water from the Jordan river system, diverted for irrigation purposes through a second great canal. This picture shows fresh water being run onto salt flats near the Dead Sea to leach out the minerals and make the land suitable for cultivation.

worse than wasted. While the eventual aim is to have all these tamed wadis fit into the unified irrigation and water-power system, obviously they can be taken in hand one by one, by either Jews or Arabs, according to whose land they lie in.

A good deal of water is expected to be obtained by tapping the underground drainage system with wells. These also can be dug and operated separately; though it is true that power for pumping will be much cheaper when the major hydroelectric plants that depend on joint action by Arabs and Jews can be built.

These partial operations are not mere salvage of scraps. They represent a really respectable fraction of the total new acreage which it is hoped will eventually be brought under irrigation. The final figure is expected to be somewhere in the neighborhood of 750,000 acres. The partial reclamations which can be carried out by the Jews alone will amount to at least 340,000 acres, mostly in the now arid coastal plain. The Arabs can reclaim about 100,000 acres without Jewish help. Moreover, declares Dr. Lowdermilk, this new land can be added within

two years if work is started promptly.

Even for the full realization of the JVA project, some time will have to be spent in research on some of the unique problems involved in the handling of the great volume of sea water to be channeled from the Mediterranean into the Dead Sea. All hydroelectric plants now in existence are run by fresh water. What kind of metals, and what type of turbine, will be needed for the great power plants? There is a challenge to metallurgists and engineers alike.

Palestine, like all the Near and Middle East, is a land where earthquakes sometimes happen just as they do in Calif-

ornia. Some very careful planning and experimental work will be needed to protect the large-scale engineering structures that will eventually be built. Here is a big job for the new profession of geophysics.

These are only a couple of the problems which the JVA engineers and administrators will have to meet and master. There is every reason to expect that these problems will be solved, and that twentieth century science will do much to make Palestine, for Jew and Arab alike, once more a land of milk and honey.

Science News Letter, March 20, 1948

CHEMISTRY

Fuel from Natural Gas

➤ GARDEN CITY, KANS., will soon become a gasoline-producing center. This motor fuel and other petroleum products are to be manufactured there from natural gas, from the neighboring Hugoton Field, which is not desirable for ordinary uses because of its low heating qualities.

The manufacturing plant is to be built by Stanolind Oil and Gas Company of Tulsa, Okla. It is a multi-million-dollar project. It will include a plant to extract liquefiable hydrocarbons such as gasoline, butane and propane from the natural gas; a synthesis plant including an oxygen-production unit; a chemical refining unit; laboratories and other buildings. The gasoline and fuel oils produced will be marketed largely in the Kansas area. The chemicals produced will be distributed nationally by U. S. Chemicals, Inc.

The huge Hugoton Field of southwestern Kansas is claimed to be the largest gas field in the United States and to contain 23,000,000,000,000 cubic

feet of gas, part of which has low heating qualities. The new plant will process about 100,000,000 cubic feet of this gas daily, it is expected.

In the process, dry feed gas from the field is burned under 300 pounds pressure with relatively pure oxygen to yield synthesis gas from which the final products are made. This synthesis gas is largely carbon monoxide and hydrogen. With the help of an iron catalyst in a fluidized state, being finely powdered, it is converted into the petroleum hydrocarbons and water.

Another plant for making gasoline and other hydrocarbons from natural gas is under construction in Texas. It will use gas of real fuel value, it is understood, not the low-heating-value gas to be used in Kansas. The supply of natural gas in America is limited, of course, but there is enough to permit the manufacture of liquid fuels from it for the next 25 years without danger to the amount needed for gas lighting and heating.

Science News Letter, March 20, 1948

CHEMISTRY

Convert Waste into Fuel

➤ THOSE great heaps of waste anthracite silt near hard coal mines may soon be furnishing homes with fuel gas and automobile engines with liquid fuel, President Frank W. Earnest, Jr., of the Anthracite Institute, Wilkes-Barre, Pa., revealed.

A new process for converting the present waste into fuel will be tested in a pilot plant under construction by the Institute's research organization of which Dr. Raymond C. Johnson is in

charge. In the anthracite country there are an estimated 200,000,000 tons of this silt immediately available, and more is produced every year.

Anthracite silt, washed out of the coal after mining, is about as fine as granulated sugar. It is not suitable for burning in grates and has accumulated at mine heads for years. Its use to produce fuel gas and liquid fuels will in no way decrease the available supply of marketable coal.

Do You Know?

Rats average 10 young to a litter, and may have up to 12 litters a year.

The pearling industry in Australia is expanding to meet American demands.

What is called the High C variety of tomatoes has at least twice as much vitamin C as the standard varieties.

There are nearly 192,000 railroad bridges in the United States; the sum of their lengths is about 4,000 miles.

Sugar is primarily a food, but it is used in hair tonics, shoe polishes, adhesives, photographic materials and explosives.

Sugar cane is a tall perennial grass; its stalk is divided into sections by joints, and each section contains a bud which will sprout when planted.

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Anthracite silt is an excellent fuel for the production of these gases, Dr. Johnson states, because it is non-coking, non-caking, free of tar, has a low sulfur content and a high ash-fusion temperature. The new process is related to the German method for gasifying brown coal. In it, the anthracite silt can be processed into three gases, two of which are fuel gases.

In the process, anthracite silt, air and steam are fed into a refractory-lined cylinder. Combustion takes place with the silt boiling inside the cylinder while the heavier ash settles to the bottom and is ejected by a rotary grate. The gas obtained is fed through a second bed of burning silt, fortifying it with addi-

tional carbon monoxide. The result is producer gas.

If gas of higher heat quality is desired, steam is forced into the burning silt in the second stage of the process. To produce gases from which liquid fuel is made, the same method of fluidized or boiling combustion bed is used. However, by intermittently blowing air and steam into the combustion chamber, or by using a continuous blast of oxygen and steam, a synthesis gas of carbon monoxide and hydrogen is produced. It is from these the liquid fuel is made as is done in making liquid fuels from natural gas or other coal.

Science News Letter, March 20, 1948

MEDICINE

Anti-Leukemia Weapon

➤ ARSENIC made radioactive in the atomic pile is now being tried in the treatment of leukemia and Hodgkin's disease, a group of University of Chicago and Argonne National Laboratory scientists reported at the meeting in Atlantic City of the American Association for Cancer Research.

The scientists are Drs. William Neal, Leon O. Jacobson, Austin M. Brues, Howard Ducoff, Robert Straube and Thomas Kelly.

"Very nice responses" have been obtained in some of the 12 patients treated so far. But, Dr. Jacobson cautioned, he does not know how long the improvement will last or even whether the present improvement is any better than the temporary responses obtained with other kinds of radiation treatment.

Use of the radioactive arsenic was started about nine months ago. It is being tried in the hope of obtaining both the chemical effect of ordinary, stable arsenic and the radiation effect of the radioactive chemical. Arsenic, as phy-

sicians know, has been used for treatment of leukemia and allied conditions since 1878.

The radioactive arsenic was first used in tracer studies on both laboratory animals and humans. These studies showed that the chemical was quickly and widely distributed throughout the body, which meant that its penetrating rays would get to the parts of the body where they were needed. The tracer studies also showed that the chemical is rapidly excreted, so there would be no danger from over-long irradiation.

Additional safeguard in the use of radioactive arsenic is the existence of BAL, or British Anti-Lewisite. This chemical can remove radioactive arsenic from the body as quickly as it removes the stable form of arsenic.

The radioactive arsenic used is arsenic⁷⁶. It has a short half-life, 25 hours, and must be used pretty rapidly after it comes from the atomic pile. It is made by pile irradiation of cacodylic acid, an arsenic-containing compound.

Science News Letter, March 20, 1948

MEDICINE

Breast Cancer in Mice

➤ A CANCER experiment which brought results exactly the opposite of the ones the scientists expected was reported by B. E. Bennison of the National Cancer Institute at the meeting in Atlantic City of the American Association for Cancer Research.

The experiments concerned the breast cancer in mice which is transmitted through some agent in the mouse

mothers' milk. The agent is thought to be a virus. Since the spleen helps in resistance to ordinary infections, Dr. Bennison removed the spleens from young mice who had been nursed by mothers carrying the cancer-causing agent in their milk. He expected the young mice to develop cancers at an earlier age than these usually appear.

Instead, it took longer for the cancers

to appear, and fewer mice developed cancer than was expected from what happened to their litter mates that did not have their spleens removed.

Possible explanations are: 1. The cancer-causing virus localizes in the spleen and when this is removed most of the virus is also removed. Or, 2, the spleen is

necessary for the multiplication of the virus.

Dr. Bennison cautions against hoping for any application of this technique to human cancers, and points out that removal of the spleen in mice has no effect on the cancer if done after the malignant growth has developed.

Science News Letter, March 20, 1948

PSYCHOLOGY

Quick As Wink Is Slow

Blinkers have a complete blackout of vision for a good three-tenths of a second, measurements by a British scientist indicate.

► HOW quick is a wink?

It is altogether too slow to be ignored by scientists, Dr. Robert W. Lawson of the University of Sheffield, England, concludes after careful measurements.

There is a complete blackout of vision, he figures, for a good three-tenths of a second. And since the winks, or blinks, are repeated at frequent intervals, you have been missing more than you probably realized.

Dr. Lawson divides blinkers into four main types. You probably belong to what he calls the J-type, since it is the most common among normal people. Men in the J-type blink every 2.8 seconds. Girls are slower. But still the inter-blink period is only a little less than four seconds. The other three groups—the plateau type, the bimodal type and symmetrical—have a longer period between blinks but are much less common.

This means that the majority of persons have their vision blacked out completely 11% of the time and have their vision at least partly blacked out about 20% of the time.

A current of air blowing into the eye increases the rate of blinking. So does the smoke from a cigarette between the lips; a bright flash of light; or a particle of dust in the eye.

Some individuals were found by Dr. Lawson to have a much more rapid blinking rate than others. This is important not only to the motorist but also in industry and in some sports. But it is of special importance in making certain kinds of scientific observations.

"In fast games like tennis or badminton," Dr. Lawson said in reporting his study to the scientific journal, *Nature* (Jan. 31), "the ball or the shuttlecock will certainly be lost to sight during the 0.3 second of the blackout due to blinking.

"For people with a high rate of blinking, bowls is a much more suitable form of recreation.

"In flying, too, the airman does not appear to have been aware hitherto of the effect of blinking on his efficiency, either in bombing a target or in fighter combat, for in the period of his blackout or mobile vision he may have travelled a distance of the order of 100 yards. The effect will be greater still for the pilot of a jet fighter."

Blinking is also important for the photographer. Dr. Lawson estimates that in taking a photograph of a group of 18 persons you might expect to find that two have closed eyes.

Science News Letter, March 20, 1948

AERONAUTICS

Return DC-6's to Service

► NO MAJOR structural problems were involved in reconditioning for service the giant DC-6 transports, 97 of which were voluntarily grounded last November. Important modifications, recommended after intensive study, have now been made and all will be in the air

soon, it is officially reported.

Some of these planes returned to service on March 15, American Airlines announced. United, Panagra, National and Braniff transports of this type will all be in use this spring. The changes made are designed to remove any pos-

sible hazards. They have been thoroughly tested by the U. S. Civil Aeronautics Administration and bear the full seal of government approval.

The grounding of these luxury liners, by voluntary action of the Douglas Aircraft Company and the five transportation systems using them, followed a safe landing of one afire in New Mexico just after a fatal crash of another in Utah. An official investigation by the Civil Aeronautics Board indicated that in both these cases gasoline which had overflowed while being transferred from alternate to main tanks in flight had entered a cabin heater air intake scoop under the fuselage.

All DC-6's resuming service have had their air intake scoops relocated in the leading edge of the wing, while the overflow vents have been conducted to the wing's trailing edge. Other changes include the replacement of aluminum air ducts in the heater compartment with stainless steel ducts, the addition of extra fire-extinguishing equipment, an increase in the number of smoke detectors, and the placing of loose-running electric wiring in conduits.

The Douglas DC-6 is described as America's first postwar air transport. The White House plane is one of this type. It is a 56-passenger craft, powered by four Pratt and Whitney engines with a total of 8,400 horsepower, and with Hamilton full-feathering, reversible-pitch propellers, which can be used to decrease the speed of the plane rapidly in landing. The craft is designed to operate most efficiently at a 15,000-foot altitude, and it has a cruising speed of 300 miles an hour. Its speed is assisted by a jet thrust exhaust system.

Science News Letter, March 20, 1948

MEDICINE

Markle Foundation Picks Group of Medical Scholars

► SIXTEEN scholars in medicine, who will teach and do research in American and Canadian medical schools for the next five years, were announced by the John and Mary R. Markle Foundation, of New York.

These scholars are the first group in a new program which provides \$25,000, payable at a rate of \$5,000 annually for the five years, from the Foundation. Twin aims of the grants are to relieve the acute shortage of teachers in medical schools and to encourage trained investigators in medical science.

Science News Letter, March 20, 1948



Ready for Spring

► **SPRING**, in the fancies of most modern poets, advances from the south, bringing buds and blossoms as she comes. It would be more accurate, and at least as pretty a picture, and possess the virtue of novelty besides, if spring were pictured as coming up from underground. Greek mythology realized this well, in the story of Persephone, but later poets seem largely to have overlooked the latent possibilities of beauty in the idea, like the flowers hidden in underground buds.

For it is true that practically all the flowers you are going to see in woods and fields this spring are already there. They were made last year and packed securely away in buds, to await the coming of the next blossom-time. Some of these buds are merely tucked away among the bases of last year's stems, as in violets, bloodroots and hepaticas. Others are more deeply embedded in bulbs or corms, as in fawn-lily, trillium and jack-in-the-pulpit. Some are even high up, on branches freely exposed to the full fury of winter gales; this is the case with all flowering shrubs, trees and woody vines.

These prefabricated flowers have to be protected during the winter not only against cold but against the cruel drying effects of the cold winds, that rob them of water while the plants' roots and stems are unable to bring up new supplies from the frozen soil. Hence the stout scales that cover tree and shrub buds, with their added protection of waxy or varnish-like coatings, or sometimes thick little pelts of plant hairs. Buds hidden under ground do not need this kind of protection and above-ground buds close to the surface usually receive at least partial protection from

snow and dead leaves, so they are as a rule less elaborately armored.

All such flowers-in-waiting receive the greater part of their protection against freezing not through any means for keeping warm, but through sap so much concentrated and thickened that it cannot form the ice crystals that would wreck the cell walls through their expansion. The sap of wintering plants is more like mucilage or syrup than it is like the watery fluid that runs

from tapped maple-trees and cut grapevines when the weather grows warm.

Thus the tight-folded, snug-packed flowers wait, concentrated in both form and fluid contents. When moisture becomes more abundantly available again they are ready to use it freely, both in expansion of what is already there and in rapid growth of new parts. The natural recipe for spring flowers is almost as simple as "Add water and serve."

Science News Letter, March 20, 1948

ARCHAEOLOGY

America's Culture Ancient

Renaissance in Central America was a century or two earlier than in Europe. Mayan learning was revived in twelfth century by the Toltec, Quetzal-coatl.

► **A REBIRTH** of learning took place in Central America a century or two before the Renaissance in Europe, Dr. Herbert J. Spinden of the Brooklyn Museum reported.

Most of the old Maya science with its highly developed astronomy and accurate calendar, in little use since the sixth century, A. D., was revived in the twelfth century under the Toltec man-deity, Quetzal-coatl.

The realization that the American continent has a culture fully as ancient as that of Europe and that an advanced civilization was developed here independently offers new hope of uniting the peoples inheriting this tradition, Dr. Spinden pointed out. All the Americas, North, South and Central, have in common the tradition of the Indian.

Nacxita Quetzal-coatl, who introduced the "plumed serpent" motif that distinguishes Toltec agricultural design, had a deep knowledge of Maya learning, Dr. Spinden stated. This is especially true in relation to the length of the tropical year and the appearance of the planet Venus as an evening and morning star. Details of his monuments show this deep understanding of the earlier civilization, also testified to by the orientation of his temples, especially the House of the Magician at Uxmal in Yucatan.

Quetzal-coatl, the Toltec emperor whose kingdom was the greatest in the New World, developed an abbreviated calendar based on the one used by the Mayas. To be accurately used for setting archaeological dates, however, it must be employed along with the more

detailed Mayan calendar. It was almost over-simplified.

It is these two calendars that make it possible accurately to date archaeological discoveries in Central America back to the time of Christ and even before. Such astronomical events as solar eclipses and phenomena of the nearer planets check to show that the dates are accurate.

Returning to Uxmal last April, Dr. Spinden found that the House of the Magician, covered with many signs and symbols of Quetzal-coatl, had been repaired to make it a safer tourist site. In the course of this work, one of the inner walls had been breached and a hitherto unknown temple exposed. The workmen probably did not realize the importance of the inner temple they entered, Dr. Spinden said. This was probably the original used by Quetzal-coatl for his astronomical observations. Several other temples in honor of this hero-god had been super-imposed upon it.

The inner temple is oriented so that its axis is only three minutes of an arc different from the famous base line at Copan, made by the Maya fully six centuries previously, Dr. Spinden's recent observations indicate. Such exact construction shows that the man who was made a god eight days after his death had thoroughly understood how the ancient Maya oriented their buildings so that each year the tropical year could be noted by observing points of sunrise and sunset. This gave them a year dial to measure time more accurately than our calendar in use today.

Science News Letter, March 20, 1948

Books of the Week

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AMERICAN WOOL HANDBOOK: A Practical Text and Reference Book for the Entire Wool Industry—Werner Von Bergen and Herbert R. Mauersberger—*Textile Book Publishers*, 2d ed., 1055 p., illus., \$8.00. Including history of the industry, technical information and an ample bibliography.

BIRDS OF PREY OF NORTHEASTERN NORTH AMERICA—Leon Augustus Hausman—*Rutgers University Press*, 164 p., illus., \$3.75. A beautiful book for bird students and bird watchers.

CHEMISTRY: A Course for High Schools—John C. Hogg, Otis E. Alley and Charles L. Bickel—*Van Nostrand*, 2d ed., 555 p., illus., \$2.88. The chapter on atomic structure and atomic energy is completely rewritten.

THE CHILD IS RIGHT: A Challenge to Parents and Other Adults—James Hemming and Josephine Balls—*Longmans, Green*, 176 p., illus., \$2.25. Written about British children but useful and interesting for American parents as well.

COMMUNICABLE DISEASES FOR NURSES—Albert G. Bower and Edith B. Pilant—*Saunders*, 6th ed., 657 p., illus., \$4.00.

THE CULTIVATED SPECIES OF PRIMULA—Walter C. Blasdale—*University of California Press*, 284 p., illus., \$7.50. A book for flower lovers as well as botanists.

DETOXICATION MECHANISMS: The Metabolism of Drugs and Allied Organic Compounds—R. Tecwyn Williams—*Wiley*, 288 p., \$5.50. An account of the chemical changes that foreign organic compounds undergo in the animal body. Intended not only for specialists but also for students, research men and others.

THE ESSENTIALS OF PLANT BIOLOGY—Frank D. Kern—*Harper*, 440 p., illus., \$4.00. An account of how life—individual and racial—is maintained in plants upon which mankind is so dependent. A text in elementary botany which is very readable for the general reader.

GOOD HEALTH IS GOOD BUSINESS—Joint Subcommittee on Health of the NPA Agriculture, Business and Labor Committees—*National Planning Association*, 44 p., paper, 25 cents.

INDUSTRIAL WEIGHING—Douglas M. Conside—*Reinhold*, 553 p., illus., \$10.00. On the design, construction and operation of scales and intended especially for the users of these important instruments.

MARRIAGE COUNSELING PRACTICE—John F. Cuber—*Appleton*, 175 p., \$2.25. A non-technical book intended to be useful alike to counselor and to client. The limitations of marriage counseling service as well as recommended practice are discussed.

NATURE OF LIFE: A Study on Muscle—A. Szent-Gyorgyi—*Academic Press*, 91 p., 7 pl., \$3.00. A series of lectures written in the United States for the University of Birmingham and the Massachusetts Institute of Technology.

PACIFIC DISCOVERY, Vol. 1, No. 1—Don

Greame Kelley, Ed.—*California Academy of Sciences*, 32 p., illus., bi-monthly, single copies 50 cents, \$3.00 a year. Containing beautifully illustrated articles by intellectual adventurers in many scientific fields. Order subscriptions from the California Academy, 2057 Center St., Berkeley 4, Calif.

REPORT OF THE COMMISSION ON TECHNICAL NEEDS IN PRESS, RADIO, FILM FOLLOWING THE SURVEY IN TWELVE WAR DEVASTATED COUNTRIES—*United Nations Educational, Scientific and Cultural Organization*, 189 p., paper, \$1.20 plus postage direct from UNESCO, 19, Avenue Kleber, Paris—16, France.

THE RUFFED GROUSE: No. 2, 1948—*Audubon Society of Western Pennsylvania*, 60 p., illus., paper, \$1.00. The second issue of a publication which first appeared in 1944, containing interesting articles not all confined to ornithology.

SAFETY FOR THE HOUSEHOLD—National Bureau of Standards—*Govt. Printing Office*, 190 p., illus., paper, 75 cents. Covering all sorts of hazards in the home from leaking refrigerator gas to loose button eyes on toy animals.

TECHNIQUE OF MICROWAVE MEASUREMENT—Carol G. Montgomery, Ed.—*McGraw-Hill*, 939 p., illus., \$10.00. The collective result of work done in many laboratories during the war by thousands of researchers as background to the development of radar.

THEORY AND APPLICATION OF MICROWAVES—Arthur B. Bronwell and Robert E. Beam—*McGraw-Hill*, 470 p., illus., \$6.00. Especially for engineers.

WELDING HELPS FOR FARMERS—James F. Lincoln Arc Welding Foundation, 431 p., illus., \$1.00.

YOUTH IN DESPAIR—Ralph S. Banay—*Coward-McCann*, 239 p., \$3.00. About juvenile delinquency.

Science News Letter, March 20, 1948

ENGINEERING

Sun-caused "Snowstorm" Discovered on Television

➤ SNOWSTORMS caused by the sun are the latest difficulty encountered in television.

The "snowstorms" are a type of visual interference well known to owners of television sets. This streaking, resembling a violent snowstorm, is usually blamed on auto ignition interference.

Now, British Broadcasting Corporation engineers believe they have found a particularly violent television snowstorm caused by radio waves from the sun.

The sun-caused snowstorm was discovered last August, E. C. Drewe and D.

Maurice of the BBC research department have reported to the British journal, *Nature* (Jan. 31). It was all over in a minute, but the violent interference with a television broadcast was so impressive that the engineers set out to find the cause. The nature of the disturbance made them suspect the sun. A check with records of solar noises verified their suspicion.

Science News Letter, March 20, 1948

Science Service Radio

➤ LISTEN in to the 18th anniversary of "Adventures in Science" over Columbia Broadcasting System at 3:15 p.m. EST Saturday, March 27. Dr. Warren Thompson, director of Scripps Institution for Population Research, will be the guest of Watson Davis, director of Science Service. Dr. Thompson, who launched the program in 1930, will discuss new aspects of the same talk he gave then—Our Future Population.

Science News Letter, March 20, 1948



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• New Machines and Gadgets •

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❁ **LIQUID-BAIT** rat trap uses water as a lure because rats are often thirsty and said to be less wary of water than of food-bait. Its one-piece base has a water-holding depression. The trap, made of rust-proof metal, can be sterilized in boiling water or flame after each use.

Science News Letter, March 20, 1948

❁ **Rocking razor**, a non-electric device made in England, makes it possible to take a dry shave at any time in any place. Its two blades working inside a perforated guard, cut the beard by a scissors movement. Rocking the razor gently, with its curved guard against the face, operates the blades.

Science News Letter, March 20, 1948

❁ **HANDY ARC TORCH** for use in alternating current welding has two copper coated carbon electrodes clamped in aluminum alloy jaws. A simple thumb control on the plastic handle of the torch permits easy adjustment of the distance between the points of the carbons.

Science News Letter, March 20, 1948

❁ **AIR-CONDITIONING** unit for a railroad passenger car has its own alternating current power plant and is completely independent of the locomotive. The unit provides heated or cooled air as needed, also cooled drinking water and energy for flicker-free fluorescent lighting.

Science News Letter, March 20, 1948



❁ **AERIAL FRAME** viewer on a new type camera permits the photographer to use both eyes, one looking through the focusing window, the other with unobstructed view as shown in the picture. Focusing through the rangefinder is first made with one eye; then both are used to keep the picture framed and observe the subject's actions at the same time.

Science News Letter, March 20, 1948

❁ **ILLUMINATED WALKING** stick, recently patented, has a shaft which is a translucent tube to which is attached a solid tip and upper part. A tiny electric lamp, flashlight type, placed at the bot-

tom of the translucent section, provides the illumination.

Science News Letter, March 20, 1948

❁ **PRUNING TOOL**, powered by compressed air, makes the trimming of lawn trees and shrubbery easy. The cutter itself, on the end of an extension rod, is operated by air released by a trigger on the handle. An eight-cubic-foot compressor, powered by a 1 3/4 horsepower motor, operates the device.

Science News Letter, March 20, 1948

Your unique chance to grow NEW flowers your neighbors won't have this spring

Only a few novel flowers are introduced to the nation's gardens—but THINGS of science has secured for its members packets of seed of three of the most outstanding kinds!

RADIANCE COSMOS—Seed of first bicolor cosmos variety ever developed, giant flowers are deep rose with crimson centers. Top winner in 1948 All-American Selection trials.

LUTHER BURBANK ZINNIAs—Seed of new pastel-shaded zinnia variety, blossoms are five inches in diameter.

CUTHBERTSON SWEET PEAS—Seed of a new type with stronger vine growth and longer stems; resistant to summer heat.

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Membership is strictly limited to 10,000 and will be for at least the next nine months. This is America's most unique "club."

Question Box

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